Sustainable results from heat recovery technology

Luc Jarry describes a successful oxy-fuel heat recovery project on a float glass furnace at AGC Glass Europe.

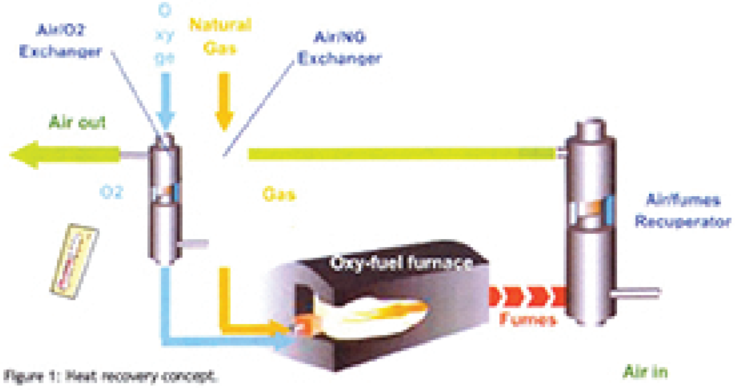

Figure 1: Heat recovery concept.

Glass producers are constantly looking for innovative ways to raise production efficiency, reduce fuel consumption and cut costs related to environmental regulations on emissions of NO_x and CO_2.

Several methods to decrease emissions have been investigated and applied for over a decade, including pretreating the batch to melt glass more efficiently, improving combustion control to reduce NO_x and switching to natural gas for lower carbon emissions.

Among the existing technologies, oxygen firing achieves these three goals at once. But although oxy-furnaces increase heat transfer and minimise emissions, 20%-30% of their energy input is lost in the flue gas. Now, Air Liquide and global glassmaker AGC Glass Europe have developed Alglass Heat Recovery to recover most of this lost heat by indirectly preheating fuel and oxygen (figure 1). This is the only current oxy-fuel technology to take advantage of this waste energy to improve combustion.

Using Alglass Heat Recovery with float glass is economically efficient because it simultaneously enhances the proven benefits of oxy-combustion, increases overall furnace efficiency, reduces CO_2 and keeps NO_x emissions low. This is a set of technologies, specifically designed and approved for safety and reliability. Among them is Alglass Sun, a specially designed concept burner with staged combustion (figure 2), which can accommodate reactants at either ambient or very high temperatures.

For each float glass furnace, eight to 10 burners are supplied with fuel and oxygen piping, connected to a series of exchangers and regulation equipment: Two air/fumes exchangers, a set of air/natural gas exchangers to preheat the natural gas to 450°C, a set of air/O_2 exchangers to increase the oxygen temperature to 550°C and fuel and oxygen valve trains (figure 3).

After two successful pilot campaigns on an industrial scale, the technology was installed in one of AGC Glass Europe's float glass furnaces. Temperatures and fluid flow rates were tracked to optimise fuel consumption at each stage of the project and to evaluate the technology's efficiency. The first results, whether for cold reactants or hot reactants, were very promising. Compared with air firing, NO_x emissions were reduced by a minimum of 75% and energy consumption was decreased to the targeted 25%. The bottom line is that despite the technical challenges involved, the furnace has efficiently produced good glass since start-up.

After several years of fruitful collaboration, AGC Glass Europe and Air Liquide are continuing to develop breakthrough technologies for efficient glass manufacturing, focusing on adapted solutions that adhere to local legislation and respect the environment, in addition to benefiting customers. ■

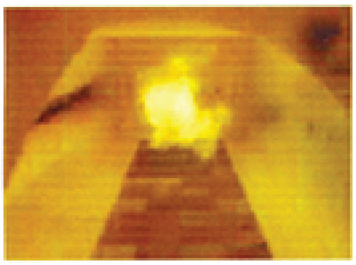
Figure 2: Alglass Sun flame.

This Air Liquide and AGC Glass Europe project was funded by the European Commission through the Life+ program.


Figure 3: Air Liquide Altec NCE valve train.

ABOUT THE AUTHORS:
Luc Jarry is Glass Market Manager at Air Liquide

FURTHER INFORMATION:
Air Liquide, Paris, France
tel: +33 1 40 62 58 97
email: luc.jarry@airliquide.com
web: www.airliquide.com